

Executive Summary and Key Findings

Long predicted to fundamentally shift the way workloads are managed, cloud computing has emerged as a game-changing information and communications technology (ICT) phenomenon with a wide array of benefits for businesses and consumers. Although to date worldwide cloud adoption has been impressive, even quicker uptake may be in store in the next several years. As in other ICT subsectors, U.S. cloud providers have earned leading global positions. One major report polled over 350 companies from around the world, finding that 17 of the top 20 enterprise cloud services came from companies based in the United States.¹ Further, on technology industry research firm Gartner's May 2014 "Magic Quadrant for Infrastructure as a Service" grid, a widely-followed tool dividing vendors based on their status as market leaders, niche players, or other roles, all but two of the 15 providers plotted were U.S. companies.²

Despite many leading U.S. cloud vendors' international presence, constructing an export profile for this sector is a difficult task. Several of the key firms are large and publicly traded, but other market leaders share less information about their internal structures. There is also an ecosystem of smaller cloud providers that may export but are not widely reported on. In other cases, details about international sales are scarce, making it hard to determine whether a given firm, even one understood to be a top vendor, has a notable footprint globally, let alone in specific regions.

In addition, at least on a basic technical level and in the absence of market access issues or infrastructure gaps, cloud services can be provided from anywhere to anywhere. This lowers U.S. cloud vendors' initial hurdles to exporting, so providers of varying sizes, focuses (e.g., customer relationship management, enterprise resource planning, collaboration, storage, or, frequently, some mix), years in operation, and other dimensions may engage in international sales. This further complicates the task of creating a coherent picture of cloud service exporters.

What is apparent is that many well-known U.S. vendors have expanded abroad aggressively, either through marketing or less commonly by establishing physical presences like sales offices or data centers. In many of the markets to which they have gone, these companies have established leading positions or at least become important competitors (often with one another).

Leadership today, however, guarantees neither that U.S. cloud vendors will succeed in every global market they enter nor that they will remain on top. Some foreign-based companies (e.g., Germany's SAP) are highly-credible competitors, while others have solid or growing stakes in their home countries (e.g., Alibaba's Aliyun in China). Moreover, in some large markets there has been discussion or enactment of regulatory measures that have the effect of disadvantaging foreign firms.

Regardless, as in ICT more broadly, the U.S. cloud industry enjoys high levels of expertise, scale, technology, resources, innovation, name recognition, and first-mover advantages. All will be helpful in maintaining the U.S. lead as cloud computing continues to take off around the world – and there is every indication that growth will continue to be this subsector's story for some time.

As in previous years, forecasts for global cloud adoption are bullish. For example, Forrester believes that businesses will spend about \$191 billion on cloud services by 2020, compared to \$72 billion in 2014.³ This projection suggests a future cloud market 20 percent larger than had been indicated in prior forecasts from the firm, which says the sector has entered a "hypergrowth" stage and is displacing on-premise setups faster than expected. IDC predicts a 2017 market worth \$107 billion, over twice as much as its 2013 estimate of \$47.4 billion.⁴

Figure 1: Projected Top Markets for Cloud Computing Exports (through 2015)

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|-------------------|--------------|-----------------|------------------------|
| 1. Japan | 6. Brazil | 11. Switzerland | 16. Italy |
| 2. United Kingdom | 7. Australia | 12. South Korea | 17. Spain |
| 3. Canada | 8. India | 13. China | 18. Singapore |
| 4. Netherlands | 9. Ireland | 14. Mexico | 19. Belgium/Luxembourg |
| 5. Germany | 10. France | 15. Sweden | 20. South Africa |

For its part, Gartner has listed cloud computing as a top technology trend for the past six years, and expects that in 2015 Microsoft's cloud profits will exceed those from its on-premise offerings for the first time, an important and symbolic transition given the company's past focus and more recent pivot to cloud services.^{5, 6} Such uniformly ambitious estimates (and the differing research methodologies to go with them) abound.

Among the key trends shaping the cloud ecosystem over the next several years is the continued prominence and even quicker rise of software-as-a-service (SaaS, in which users access virtual applications, such as office productivity software, hosted on remote servers), the cloud segment widely expected to show the strongest growth in both revenues and deployments. One prediction is that by 2016, worldwide SaaS revenues will total approximately \$106 billion.⁷ Other forecasts call for over \$78 billion in 2015 SaaS sales and more than \$132 billion by 2020, or \$50.8 billion in 2018 revenues from SaaS-based business applications alone.^{8, 9} While dollar figures differ, usage projections are equally compelling.

Cisco's comprehensive Global Cloud Index study found that in 2013, SaaS workloads were already nearly as common as infrastructure-as-a-service-based ones (IaaS, the most basic model, providing virtual computing infrastructure like storage and networking functions) (41 percent of the total versus 44 percent). The study posits, however, that at 59 percent come 2018, SaaS workloads will far outpace those attributable to either IaaS (28 percent) or platform-as-a-service (PaaS, a developer-focused cloud model offering platforms and tools for application creation) (13 percent).¹⁰ The report authors point to growing trust in SaaS as this service delivery model becomes more mature and commonplace, as well as the increasing utility of applications offered through it, as key drivers for this leap.

Wider adoption of public cloud services, at least in the long term, is another important trend. Although security concerns continue pushing many towards hybrid cloud deployments (in which an organization utilizes both public and private cloud systems for different business processes), public cloud expenditure will still grow six times as quickly as overall IT spending over the 2013-18 time horizon, more than doubling in value to \$127 billion by the end of this period.¹¹ Other estimates are even more

optimistic, calling for \$250 billion in public cloud spending by 2017, from \$158 billion in 2014.¹² Possible explanations for this trend include the growing understanding that cloud vendors offer state-of-the-art security; the innovative security-related services actually being marketed by those vendors; a gathering boom in value-added offerings available through public clouds; the popularity of "cloud first" approaches in procurement ecosystems; and greater overall trust in public clouds.^{13, 14, 15}

This does not preclude the continued popularity of hybrid approaches, which incorporate some public cloud services and could be in use in 50 percent of businesses by 2017, especially given that security remains a paramount worry and the response is often to hold some data in-house.¹⁶ Nor does it mean that private clouds will become irrelevant in the next few years, with at least two credible surveys pointing to their continued importance (although in one case also predicting a slight decline in usage and corresponding rise in public cloud utilization).^{17, 18}

However, with time, maturity, and familiarity, public cloud services are likely to become an even more important factor than they are today.¹⁹ Indeed, by 2018 public cloud is expected to constitute "more than half of worldwide software, server, and storage spending growth," according to IDC.²⁰ One prominent example of this trend is General Electric, a U.S.-based but global company that in 2014 rolled out over 90 percent of its applications in a public cloud environment.²¹ In addition, greater public cloud adoption may spur wider SaaS usage, since SaaS constituted 70 percent of public cloud spending in 2014.²²

Much of the expected rise in international cloud usage will come from markets like those mentioned in this report. Particularly in developed countries, foreign ICT decision-makers, though responsive to their own unique contexts, often share many of the same cloud-related motivations and concerns as their U.S. counterparts. One recent survey received comparable responses from a group comprised of Australian, Brazilian, German, Singaporean, and British managers to those from their North American counterparts.

There were clear similarities in their objectives in utilizing cloud services, the concerns preventing them from rolling out cloud-based business applications, and misgivings about their "current digital supply chain."²³ The extent of overlap in such factors, both

positive and negative, should be a boon to U.S. cloud providers hoping to focus their energies on addressing a core set of globally-relevant issues.

Across developed and developing markets alike, there has also been a clear trend of firms in more traditional industries tapping into ICT solutions to increase productivity, enhance efficiency, or otherwise improve business processes (e.g., human resources, customer relations management, and logistics). This accords with the findings of the McKinsey Global Institute, which determined through an international survey of small- and medium-sized enterprises that three-quarters of the economic benefits generated by the Internet accrue not to purely ICT companies but to those in traditional sectors (e.g., manufacturing), often through productivity gains.²⁴ As economies around the world grow and local businesses of all types recognize the value of implementing ICT solutions, cloud vendors can expect to see greater interest not just from technology groups, but from manufacturers, retailers, and other more conventional sources.

At the same time, the international landscape also presents a variety of unique challenges for U.S. companies. For example, many foreign buyers have expressed concerns about who has access to their data and privacy in general. Following the surveillance disclosures, trust-related issues like these increasingly give pause to those considering the purchase of cloud services from U.S. vendors, especially those who do not store data locally.

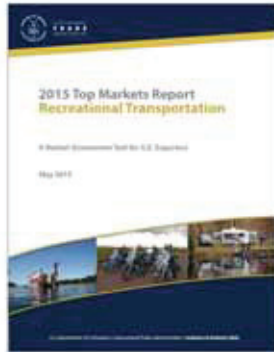
Additionally, many governments around the world continue to contemplate or institute measures that make it harder for U.S. cloud providers to compete locally.

These include data localization rules (i.e., requirements to store user data in domestic servers), which create significant costs and technical inefficiencies. As cybersecurity depends most directly upon the technologies and processes used to secure information and not the physical location of data servers, these policies can fail to provide the sort of

security purportedly sought. The underlying motivations for such proposals may involve a mix of cybersecurity-related concerns, protectionist impulses, or in some cases a desire within foreign governments to show receptivity to local security concerns and mount some sort of response, however flawed. Even when not protectionist in their intent, these policies can notably hinder non-domestic cloud vendors.

This report describes specific barriers as well as other issues affecting the attractiveness of various global markets for U.S. cloud computing providers. It also attempts a ranking of the top twenty markets for cloud computing, with a focus on enterprise adoption. This is based on export data from the U.S. Bureau of Economic Analysis (BEA) and a wide variety of reports and statistics on topics such as policy and regulatory environments, Internet infrastructure, business adoption, and several other items (see the methodology annex for further details). This, in turn, has been weighed by U.S. Department of Commerce trade specialists in light of their existing knowledge and expertise, extensive research into the markets profiled, and in some cases feedback from in-country staff.

The results are a subjective but well-reasoned ranking and several country reports that should be instructive. The chief caveat is that authoritative data on cloud computing exports is presently unavailable. Although BEA maintains reliable statistics and the figures examined correspond to categories most likely to include cloud exports, a wider body of data on which to base numerical comparisons or explain anomalies is lacking. Nor is there a universally-recognized methodology or set of indicators that will lead to an indisputable ranking. In addition, there is substantially more relevant, non-numerical information available about some markets than others. Despite these challenges, this *Top Markets Report* is a thoroughly-researched document that makes sense of a limited body of information and provides meaningful insights for policymakers, market participants, and others.



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